

The Effects on 4th Grade Student Math Proficiency and Motivation Using an Interactive Standards-Based Management System

IOWA STATE UNIVERSITY
Action Research Project CI 515

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Introduction

Currently school districts across the state of Iowa are working to provide evidence that a process is in place to ensure that all students are learning the essential concepts and skills outlined by the Iowa Core Standards. All school districts in Iowa are required to fully implement the Iowa Core for grades K-8 by the 2014- 2015 school year. According to the Iowa Department of Education (2011) “The Iowa Core is not course-based, but rather is a student-based approach that supports high expectations for all students” (§ 2).

The state of Iowa’s standardized test, *Iowa Test of Basic Skills (ITBS)*, has evolved into the *Iowa Assessments*. This revamped test now aligns with the Iowa Core Standards. Because my current district of employment, along with many others statewide, are putting an increased emphasis on using the Iowa Core to guide curriculum and develop assessments, the Iowa Core has become the set of standards for this study, specifically the number and operations-fractions section.

Area of Focus

The purpose of this action research study is to identify the effects of a standards-based management system, *ActiveGrade*, on 4th grade student proficiency of fractions aligning with the Iowa Core standards. This area of focus has derived from my desire to manage a standards-based (SB) classroom environment in a more effective manner. The interactive SB management system, *ActiveGrade*, has been designed for students to self-monitor their level of proficiency on standard aligned assessments. Beyond communicating a score, teachers leave comments and/or connect tutorials and activities with assessments, so that students may work towards proficiency on their own.

Research Questions

The research questions for this study are stated as followed:

- How will using an interactive standards-based management system (i.e. *ActiveGrade*) affect 4th grade student proficiency in “number and operations-fractions” of the Iowa Core Standards.
- How will using an interactive standards-based management system (i.e. *ActiveGrade*) affect 4th grade student motivation to learn the “number and operations- fractions” standard of the Iowa Core.
- How will using an interactive standards-based reporting management system (i.e. *ActiveGrade*) affect 4th grade student performance on standardized math assessments.

Literature Review

This literature review will describe three emergent themes related to using an interactive standards-based management system in the classroom. The review will synthesize the principles of a traditional standards-based (SB) approach along with the theories that affect student motivation and self-regulated learning, based on which, a new perspective of using interactive management systems emerges. Finally, literature on how technologies have been used to enhance the SB system will be examined and will suggest further research.

Implications of Standards-Based Grading and Reporting

Because *ActiveGrade* is a standards-based management system, one must understand the underlying principles of standards-based education. Standards-based

(SB) grading practices are based on constructivist theories of learning and brain-based research. Constructivists believe students should reflect upon and construct meaning of their learning. This self-assessment helps students determine their own strengths and weaknesses. The teaching/learning process should integrate curriculum that helps students construct knowledge for themselves (O'Conner, 2009).

As standards-based report cards are becoming more “commonplace” (Cox, 2011, p. 2) as a means to communicate an accurate representation of achievement, the corresponding grading practices do not consider students’ attitude, motivation, or participation with the grade itself (Tierney, Simon, & Charland, 2011). Grades should convey how well students have achieved standards. According to Brookhart (2011), “grades are not about what students *earn*; they are about what students learn” (p.12). Standards-based grading and reporting allows teacher to base “grades or marks on explicit learning criteria derived from articulated standards” (Guskey, Jung, & Swan, 2010, p. 5). Product, process, and progress criteria, as listed below, are distinguished within quality reporting systems (Gusky & Jung, 2006).

- Product: criteria that focus on students’ level of proficiency based on demonstrations of learning on overall assessments of learning.
- Process: criteria that relates to what students did to achieve a level of proficiency. This might include evidence from daily work and quizzes. It also includes elements such as effort, class behavior, and work habits.
- Progress: criteria that focus on how much students gain over time. It is also referred to as “learning gain, improvement scoring, value-added learning, and educational growth” (Guskey & Jung, 2009, p. 56).

O'Conner (2009) bases his criteria for grading within other two commonly used concepts: "formative and summative" (p. 117). Formative assessments are not to be graded but are used as a means to guide the instruction and provide on going feedback to the learner. This type of assessment directs the student towards making improvements or adjustments as they learn. Summative assessments are graded and are used to make judgments about students' achievement.

Most standards-based report cards or grading systems provide the "product" (Guskey & Jung, 2009, p. 55) or "summative" grades (O' Conner, 2009, p. 117). Typically these systems do not provide any formative assessment tools, other than students being able to see their degree of proficiency on specific standards. Feedback is usually limited or nonexistent. The nature of feedback within a standards-based management system is an area that requires investigation. The role that interactivity and formative feedback potentially plays is key to whether or not a standards-based management system is an effective tool in the self- regulated learning process.

Feedback and Self-Regulated Learning

Learning is a dynamic process in which feedback is used. Feedback is the information provided by an agent (teacher) regarding aspects of one's performance or understanding (Hattie & Timperley, 2007). Some would categorize guidance in a separate category than feedback. For example, feedback can be considered the level of correctness/proficiency and guidance would be any direction given. In this synthesis, feedback and guidance will be used synonymously.

Feedback is one of the top influences on student achievement (Souter, 2009). In a case study conducted by Souter (2009), it was determined that the nature of feedback

was significant. Research indicates that giving quality feedback can improve student achievement and motivation by providing a “consequence of performance” (Hattie & Timperley, 2007, p.). The feedback given can provide students with corrective information, an alternative strategy, information to clarify ideas, and encouragement (Hattie & Timperley, 2007).

In learning, feedback takes on an instructional role and needs to “provide information specifically relating to the task or process of learning that fills a gap between what is understood and what is aimed to be understood” (Hattie & Timperley, 2007, p. 82). Feedback is a critical component for students’ self-regulated learning. A self-regulated learner would be one who takes the given information and utilizes it in a proactive and strategic manner (Moos, 2011). Moos (2011) claimed that “self-regulation is recursive in nature because of a feedback loop, which provides the framework from which students adapt their self-regulated learning” (p. 14). Theories of self-regulation imply that students see learning as having tangible and intangible implications (Zimmerman, 1990). Tangible and intangible learning outcomes are based on perspectives of motivational studies.

Perspectives of Motivation and Technology

Motivational studies in education are broad and based on three main perspectives: the behaviorist perspective, the humanistic perspective, and the cognitive perspective (Na, Kang-hao, & Chung-hao, 2010). Zimmerman (1990) denotes that behaviorally oriented perspectives focus on tangible results such as social or material improvements. Cognitively oriented perspectives “emphasize in tangible outcomes such as self-actualization, self-efficacy, or reduced cognitive dissonance” (Zimmerman,

1990, p. 11). Motivation is complex and dynamic and has a diverse influence on behavior. Gurland and Glowacky (2011) studied the various motivational strategies and their corresponding effects on children ages 8-12. Results from this study determined that “children display individual differences in the types of motivation by which they regulate their behavior around various tasks (p. 8).

Although theories of motivation in the educational and psychological fields of study provide relevant perspectives in technology- supported instructional design, there is a lack of research and empirical studies (Na et al., 2010).) Other researchers in the field have found a correlation with technology usage and motivation. For example, case studies have shown an increase in students’ self-efficacy, control, and goal orientation (Jackson & Songer, 2000). Motivation in the field of technology continues to be studied.

Summary

As a synthesis of themes related to using an interactive standards-based management system in the classroom, this literature review points out critical components that can potentially have an effect on research in this area. Principles of SB practices lead to implications on feedback and self-regulation. Thus, the nature of feedback and the use of technology may have the potential to motivate learners.

Recommendations for further research include the further study of the role that interactive standards-based management systems have on grading practices. Because standards-based management systems (like *ActiveGrade*) are relatively new, there is not much research available regarding their usage and impact.

Intervention

The goal of this action research project is to see how using *ActiveGrade* will impact 4th grade student learning of fractions based on the standards of the Iowa Core. *ActiveGrade* is an online standards-based grade book that provides insight into student strengths and weaknesses to engage students individually (ActiveGrade, 2012). Each student is provided detailed feedback on performance of standards-based assessments with links to activities and directions of how to improve.

Students using *ActiveGrade* were compared with students who did not use *ActiveGrade* during a two-week data collection. The results of this research project will support administrators within the district in making decisions about which standards-based grading system to select.

Membership of the Action Research Group

For this action research project, two sections of 4th grade students participated in a rural Iowa middle school. The school is under a whole-grade sharing contract with a neighboring school district. Both districts have a 1:1 initiative, which provides each student in grades 6-12 with a laptop. Grades 4 and 5 have laptops as well; however, they do not take them home. Each student participant has access to computers daily.

The participants of this study include two sections of 4th grade students, two teachers (myself and another), and myself, as the researcher. The participating teacher has over 15 years of teaching experience in multiple grade levels. Of those years, she has spent the majority teaching 1st grade. This was her first year back teaching 4th grade since the implementation of the Iowa Core; therefore, the Iowa Core standards for 4th grade were new to her. She is the teacher of one section of the students observed (Class A) and was actively involved in the planning and

implementation of the standards-based unit of fractions used in this study.

I have been teaching for five years, and one of those years was spent teaching K-6 Technology. The other four years have been spent teaching various subjects in grades 4-6. Currently, I am teaching in a 4th grade self-contained classroom, which includes the second section of students from this study (Class B). I have experience in teaching with the Iowa Core standards; however, *ActiveGrade*, was new to me. No participants were familiar with *ActiveGrade* prior to this study.

Negotiations to Be Undertaken

Before this project began, contact was made with the school's principal and superintendent via email, and consent was given. Next, the participating teacher was approached to join me in planning and teaching a standards-based unit of fractions with the understanding that data was going to be collected from her students. Names of the school and teacher were not utilized, and numbers were assigned to each student for the data analysis and reporting. Because students and parents signed a technology and Internet usage permission form at the beginning of the year, a separate permission slip prior to this study was not needed.

Timeline

January	Identified an area of focus and established research questions.
February-March	Review of the literature
March	Negotiations, data planning
April 2	Conduct pretest, begin intervention
April 10	Conduct standards-based assessment #1

April 17	Conduct standards-based assessment #2
April 18	Conduct posttest and student opinion survey
April 19- 27	Data Analysis, findings reported, action plan created
April 28	Present findings at ISU

Data Collection and Analysis

The participants of the study began the standards-based unit of fractions; data was collected throughout the first two weeks. Data was obtained through two standards-based assessments, a student opinion survey, a student focus group, and the number sense portion of the Assessment For The California Mathematics Standards. The following table illustrates what data sources were obtained and examined to answer each research question.

Research Questions	Data Source(s)
1. How will using an interactive standards-based reporting system, i.e. <i>ActiveGrade</i> affect 4 th grade student proficiency of the Iowa Core's "number and operations-fractions"?	Standards-based assessment #1, standards-based assessment, #2
2. How will using an interactive standards-based reporting system, i.e. <i>ActiveGrade</i> affect 4 th Grade student motivation to gain proficiency of the Iowa Core's "number and operations-fractions"?	Student opinion surveys, observation
3. How will using an interactive standards-based reporting system, i.e. <i>ActiveGrade</i> affect student	Assessment For The California Mathematics Standards

performance on a standardized math assessment?	
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Table 1

During the duration of data collection, both classes followed the same pacing, used the same materials, learned similar strategies, and were given the same assessments. The participating teachers met daily to discuss language and presentation of new information to ensure consistency. The variable in this study was the intervention, *ActiveGrade*. Class B was provided access to *ActiveGrade*, while Class A was the control group. Each class of participants met for an hour each day to learn and practice the concepts and skills of fractions. Class B used the first five minutes of each session to check their *ActiveGrade* assessment scores and feedback. Students were also encouraged to log in to *ActiveGrade* during individual work time, free time, and at home.

On the first day of the intervention, all student participants were given the number sense portion of the Assessment for the California Mathematics Standards (See Appendix B) as a pre-assessment and attempt to answer the third research question. This standardized assessment was chosen as a data source because it can be administered at any time and is aligned with the Common Core State Standards. The Iowa State Board of Education integrated the Common Core State Standards for Literacy and Math into the Iowa Core in 2010 (Department of Education, 2011). The number sense portion of this assessment contains 19 questions regarding concepts and skills of fractions. To ensure consistency, the pre-assessment was administered to all participants by the researcher.

The students of Class B were also introduced to the intervention, *ActiveGrade*,

on the first day of data collection. Because the students of Class B were already familiar with standards-based grading using a four-point rubric, the day's tutorial focused on how to log in, how to navigate, and what information was available to them. Also, students were shown how they interact with the site by leaving questions or comments.

During the next two weeks, students learned three of the fraction essential concepts as outlined in the Iowa Core and listed below.

- Equivalent Fractions

4.NF.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fractions models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

- Comparing Fractions

4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $<$, or $=$, and justify the conclusions, e.g. by using a fraction model.

- Adding and Subtracting Fractions

4.NF.3.C Add and subtract mixed numbers with like denominators, e.g.,

by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.

Using a rubric (See Appendix C) created for the standards-based unit of fractions, students were given a score ranging from 1 to 4 at the end of each day. On the standards-based scale used for this study, 1 represents “no understanding”, 2 represents “little understanding”, 3 represents “demonstrating knowledge but inconsistent”, and 4 represents “consistent understanding”. Proficiency is obtained by earning a 4 on the rubric. The scores of Class B participants were entered into *ActiveGrade*, along with specific feedback of how the student performed and suggestions of how to improve. The comments left for individual students included links to online practice and video tutorials. Below is a figure of the student view of *ActiveGrade*. Levels of mastery are color-coded for easy viewing and analyzing (ActiveGrade, 2012). Red represents below proficiency, and yellow represents emerging proficiency, and green represents established proficiency. On the right side of the student view is the comments left by the teacher (me).

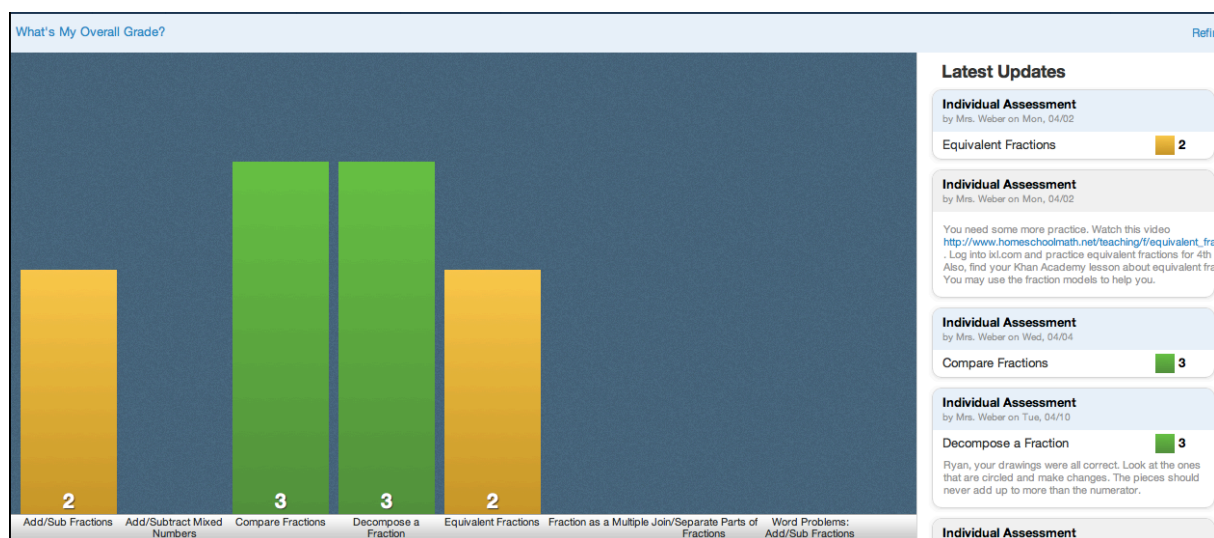


Figure 1

On designated days, students were given two standards-based assessments (See Appendix D). These assessments were administered to participants of both classes to provide consistency. Both assessments were conducted to answer the first research question. To measure student proficiency, the assessments were scored using the four-point rubric.

At the conclusion of the two-week study, the Assessment for the California Mathematics Standards was re-administered to see any student improvement or growth. Also, each student participant was given an anonymous student opinion survey (See Appendix E). The results of the student opinion survey were used to answer the second research question. The survey was designed using a Likert scale for the responses. The scale begins with a statement and then asks the student participants to respond on an agree-disagree continuum (Mertler, 2009). The age of the participants was taken into consideration during the designing and administering of the survey. The figure below illustrates how each response option on the Likert scale was associated with face. During administration, the survey statements were read aloud to the participants due to the varying reading abilities within the group.



Figure 2

Throughout the data collection portion of this action research project, all assessments, surveys, and results were shared with the teacher participant. Next, the

data was scored and analyzed the following methods using Microsoft Excel.

- Measures of central tendency
- P-value
- Percentages and Distributions

Findings

Research Question #1

The standards-based assessments were given twice throughout the data collection period. The first assessment (See Appendix E) covered comparing fractions and equivalent fractions. A separate standards-based grade (proficiency score) was assigned for the two topics based on how well the students performed within the four-point rubric. The charts below illustrate the student participants' proficiencies of both classes.

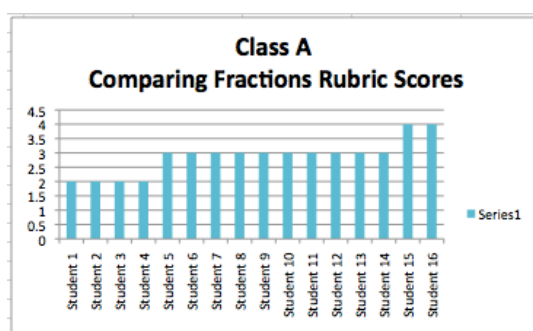


Chart 1.a

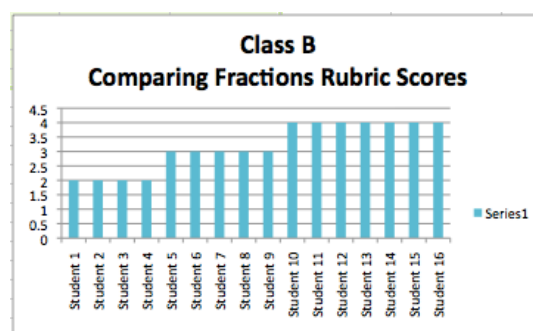


Chart 1.b

43.75% of the student participants of Class B scored a 4(proficient), while only 12.5% of the student participants of Class A scored a 4(proficient). 31.25% of the student participants of Class B scored a 3, while the majority of students (62.5%) scored a 3. Both classes had 25% of the student participants score a 2 on the rubric, and

neither class had a student participant score a 1(below proficiency). The data indicates that Class B gained proficiency at a higher rate than Class A. The following charts illustrate the distribution of scores of Class A and B.

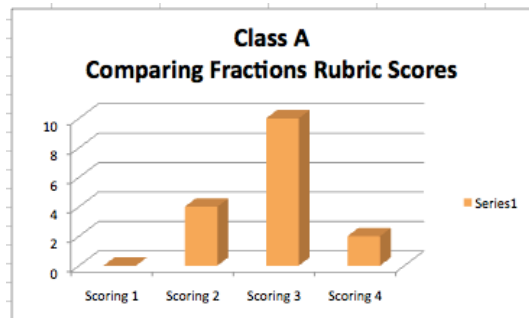


Chart 2.a

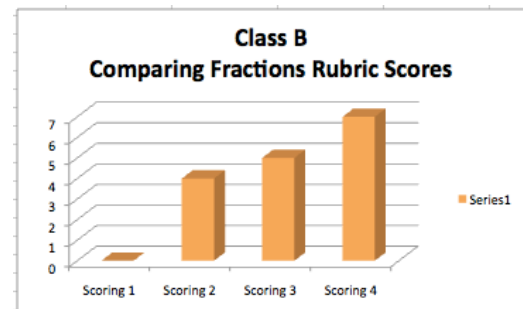


Chart 2.b

The second standards-based assessment (See Appendix D) given covered all three of the fraction essential skills from the Iowa Core that were chosen for the data collection. Again, each skill was given a separate standards-based grade (proficiency score). The analysis of assessment two revealed a similar result to assessment one.

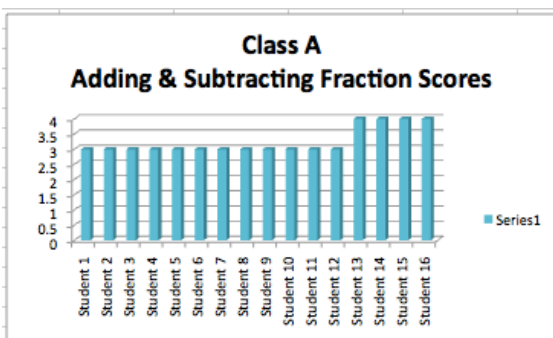


Chart 3.a

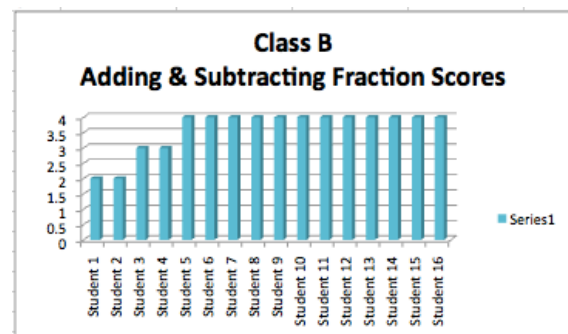


Chart 3.b

75% of the student participants of Class B scored a 4(proficient), compared to 25% of the student participants of Class A. 12.5% of the students participants of Class B scored a 3, compared to 75% of the student participants from Class A. Class B had

12.5% of student participants score a 2, while Class A had none. Neither class had student participants scoring a 1 (below proficiency). Class B had a higher percentage of participants scoring proficient on both standards-based assessments. The following charts illustrate the distribution of scores within Class A and B.

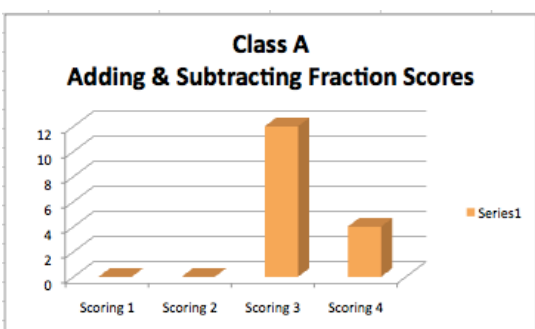


Chart 4.a

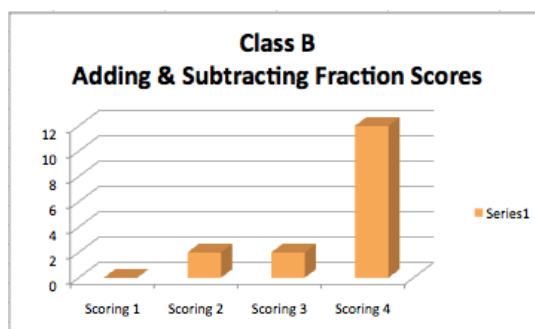


Chart 4.b

Research Question #2

Sundre (2000) created the Student Opinion Scale (SOS) using a five-point Likert scale. The statements of the survey were categorized in two categories of measure: importance and effort. Responses were summed to form three scores: Total Motivation, Importance, and Effort. (Sundre, 2000) According to Sundre (2000), “higher scores are indicative of greater self-reports of motivation” (p. 2). A similar approach was used to analyze the results of the Student Opinion Survey given to participants of this action research project.

Responses to the statements categorized to measure importance provide the degree of personal relevance of the learning to the participant. Responses to the statements categorized to measure effort provide the level of effort the participants engaged in during the learning. Responses were summed to create a total motivation score. The central tendency was calculated from the scores of both classes. The

following table shows the results of the central tendency calculations.

	Mean	Median	Mode	Standard Deviation	p-value
<i>Class A</i>	<i>46.470</i>	<i>50</i>	<i>52</i>	<i>8.132</i>	<i>.008 < α</i>
<i>Class B</i>	<i>52.526</i>	<i>53</i>	<i>51</i>	<i>5.738</i>	

Table 2

The mean and median were higher for Class B's total motivation score. This appeared to be a significant difference; however, an independent T Test was conducted using Excel to statistically determine. Upon comparing the two arrays of data, a p-value of .008 resulted. To see if this is indicative of a significant difference between the classes' total motivation scores, the p-value was compared to the alpha level, which is typically set at 0.05 in educational research studies (Mertler, 2009). Because the p-value was less than the alpha value, the statistical difference was determined to be significant. The following chart was created to visually compare the total motivation scores of both classes. The resulting chart illustrates the relationship between Class A and Class B's total motivation scores overall.

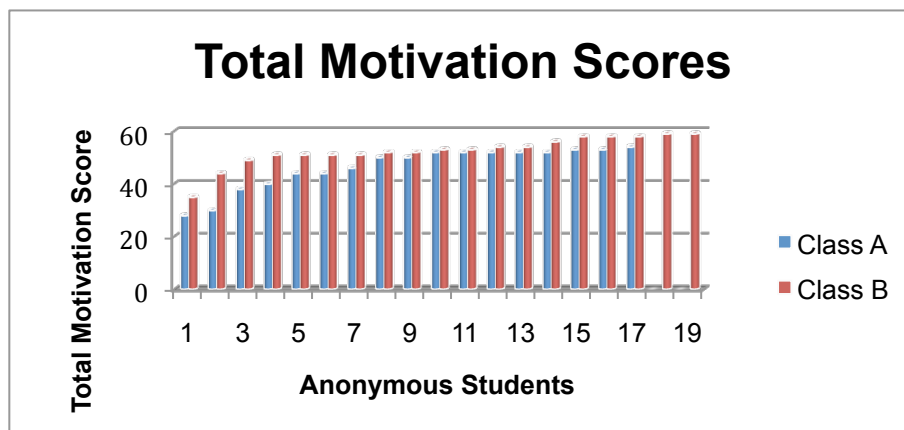


Chart 5

An optional written response question was given at the end of the student opinion survey. The student participants' responses to the written opinion question also confirm that overall the students from Class B were motivated by the use of *ActiveGrade*. The statements of participants (pseudonyms used) are as follows:

Question read aloud: Do you feel that *ActiveGrade* has helped you. If so, how?

Julie: Yes, because I was bad at it then I got really good at it. I love fractions!!

James: Yes, because it helps me do better on more things in Math. I love fraction! 😊

Kyle: yes because it tells you what the best website is to study.

Justin: NO!!

Stef: I think that it helps because I was never this good at fractions

Tom: Active grade is helping me because it gave me math sites to go to and teachers me.

Shelby: It has helped me to encourage myself to get a 4 and a green. And sometimes if I were to look at my grades on a paper sometimes I wouldn't understand it.

Tara: I think activegrade helps me because I no what I can do to help me if I need help and I no what & how I am doing on each day.

Jim: by telling me the score

Casey: I think that activegrade is helping me because it tell me how good I'm doing and if I'm not doing good then I know what to work on.

Jayden: Activegrade has help me a lot because I can see what I have to do so it has really helped me.

Sara: I think it helps by telling us what we need to fix. And tells us what we need to work on.

Caleb: I do think it help me because when I look at it I know if I need to work on it and it helps me.

Bob: it really has helped me cause it will tell me what to do and how I should do it or what not to do. It really has made me improve my skills and now I know what I'm good at and what I need to learn.

Dane: No, it didn't help me.

Katy: yes it did so it was so so fun and it help me for completing all of the fractions I got all of the good stuff like ixl.com

Two of the participants choosing to write a response to the questions answered that *ActiveGrade* was not a help to them. The rest of the responses were positive and gave credit to *ActiveGrade*.

Research Question #3

The pre-assessment and post-assessment, the Assessment for the California Mathematics Standards, were scored and measures of central tendency were calculated. Class B scored higher on all the measures calculated than Class A on both the pre-assessment and the post-assessment. The table below shows measures of central tendency.

	Mean	Median	Mode	Standard Deviation
Class A				
<i>Pre-Assessment</i>	6.687	6	6	2.868
<i>Post- Assessment</i>	10.058	10	9,11	2.904
Class B				
<i>Pre-Assessment</i>	8	9	9	3.004
<i>Post-Assessment</i>	12	12	13	3.429

Table 2

To determine if the intervention had an effect, I looked at the growth of the measures between the pre-assessment and the post-assessment. Class A's test score average increased by 3.371; Class B's test score average increase by 4. Even though Class B has shown a larger growth of the performance on the Assessment for the California Mathematics Standards, it does not appear to be significant.

Summary

The data revealed an increase in percentage of students obtaining proficiency of fractions based on the standards of the Iowa Core. The student participants using *ActiveGrade* obtained proficiency at a faster rate when compared to the student participants of Class A. The difference in student motivation scores was determined to be statistically significant, and the student written responses support the use of *ActiveGrade* as a potential cause. The growth of student performance on the Assessment for the California Mathematics Standards did not reveal a significant difference between the classes. There is an apparent correlation found between proficiency and motivation with the use of *ActiveGrade*; however, the extent of effect *ActiveGrade* had on student learning cannot be definitively determined. More research is needed.

Action Plan

The school district from this action research project is in the process of developing a standards-based grading policy and adopting a management system. One of the systems being looked at is *ActiveGrade*. I'm excited to share my experience and findings of this study with the administration of the school. Also, I would like to be an integral part in the professional development, which would include the training and implementation of the management system.

After reporting the findings from this study, it is apparent that the long-term effects of using *ActiveGrade* need to be researched. My plan is to continue using *ActiveGrade* with my students and see if there is any impact to their performance on the Iowa Assessment next year, specifically the number and operations-fractions.

Next, I intend on using *ActiveGrade* for language arts. I'm in the process of entering the literacy standards from the Iowa Core and creating four-point grading rubrics. It will be interesting to see how using *ActiveGrade* with other subject matter or units of study will impact student learning and motivation. The teacher participant from the study is interested in having the students from Class A also utilize *ActiveGrade*; therefore, both sections of 4th grade students will be using the management system in the future.

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Appendix A

Author(s)	Year	Variables Considered in the Study				
		Program Effectiveness	Student Attitudes	Feedback/motivation	Self-appraisal/ Perception of ability	Principles/ challenges for SBG
Ballard, Amy Copeland	2010					
Martins, Brabander, Rozendaal, Boekaerts	2010			*		
Bundara, Albert	1993		*	*	*	
Cox, Keni Brayton	2012	*				
Tierney, Simon, Charland	2011					*
Weiner, Bernard	2010			*	*	
Baer, Judith	2011		*		*	
Dobrow, Shoshana Smith, Wendy Posner, Michael	2011		*	*		
Brookhart, Susan	2011					*
Gusky, Thomas	2004					*
Marzano, Robert Heflebower, Tammy	2011					*
Guskey, Thomas Swan, Gerry Jung, Lee Ann	2010					*
Gusky, Thomas Jung, Lee Ann	2009					*

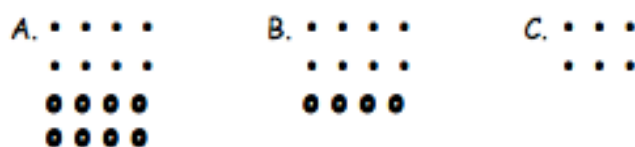
Assessment For The California Mathematics Standards Grade 4

NS 1.5

- a. Circle the picture below that shows $\frac{3}{4}$ shaded.



- b. Circle the picture below in which $\frac{2}{3}$ of the dots are small.



- c. Circle True or False

1. $\frac{1}{3} > 2.5$	True	False
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2. $\frac{5}{2} < 2.7$	True	False
------------------------	------	-------

3. $\frac{8}{12} = \frac{2}{3}$	True	False
---------------------------------	------	-------

4. $\frac{3}{7} < \frac{10}{21}$	True	False
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Assessment For The California Mathematics Standards Grade 4

NS 1.6

Write each fraction or mixed number as a decimal.

a. $\frac{1}{2} =$ _____

d. $\frac{1}{4} =$ _____

b. $\frac{3}{10} =$ _____

e. $1\frac{25}{100} =$ _____

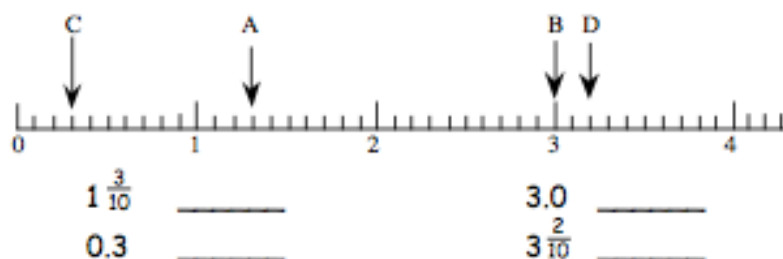
c. $11\frac{2}{100} =$ _____

NS 1.7

a. Represent the fraction $\frac{3}{5}$ using the figure below.



b. Write the letter that shows where each number goes on the number line:



NS 1.8

Draw a number line and show -2 on it.

Assessment For The California Mathematics Standards Grade 4

- NS 1.9** Write the letter that represents where each number would go on the number line:

a. $1\frac{1}{4}$ _____ b. 2.50 _____ c. $\frac{3}{4}$ _____



- NS 2.1** a. $14 - 3.21 =$ _____ b. $7.4 + 0.34 + 51 =$ _____

- NS 2.2**
- a. Round 3.19 to the nearest tenth. _____
- b. Round 3.19 to the nearest whole number. _____

Fraction Assessment Rubric

Recognizes and generates equivalent fractions	Accurately generates equivalent fractions	Recognizes and generates equivalent fractions inconsistently	Has little understanding of Equivalent fractions	Does not demonstrate understanding
Compare Fractions	Accurately compares fractions by creating common denominators or numerators and can justify with fraction model.	Compares fractions against a benchmark fraction such as $\frac{1}{2}$ but inconsistently creates common denominators or numerators	Has little understanding of comparing against a benchmark fraction or interchanges less than, greater than, and equal to symbols	Does not demonstrate understanding
Identifies the whole for fractions (Join/Sep. parts of fractions)	Identifies and gives examples of fractions that equal one whole	Identifies the whole for fractions, but needs manipulatives to give examples	Cannot identify fractions or give examples	Does not demonstrate understanding
Decomposes a fraction	Accurately decomposes a fraction into a sum of fractions, records with an equation, and justifies using a fraction model	Decomposes a fraction into the sum of fractions but is unable to record with an equation or justify	Shows little understanding of decomposing a fraction	Does not demonstrate understanding
Identifies fractional parts of a collection of objects	Correctly identifies and demonstrates fractional parts of a collection of objects	Identifies fractional parts with use of manipulatives	Cannot demonstrate higher knowledge	Does not demonstrate understanding
Add/subtract mixed numbers	Accurately adds and subtracts mixed numbers by creating common denominators and correctly uses properties of operations	Demonstrates knowledge of adding and subtracting mixed numbers but cannot create common denominators.	Shows little understanding of adding and subtracting mixed numbers	Does not demonstrate understanding
Solve word problems involving addition/subtraction of fractions	Correctly and consistently solves word problems involving and distinguishing between addition and subtraction of fractions	Demonstrates knowledge of adding and subtracting fractions but cannot consistently distinguish what problem is asking	Shows little understanding of solving word problems	Does not demonstrate understanding
Uses a calculator to rename any fraction as a decimal or percent	Consistently generates fraction, decimal, and percent relationships using a calculator	Inconsistently demonstrates knowledge of renaming fractions as a decimal and percent	Shows little understanding of solving word problems	Does not demonstrate understanding

Fraction Test

Name _____

Equivalent Fractions

$$\frac{1}{6} = \frac{\boxed{}}{18}$$

$$\frac{2}{4} = \frac{\boxed{}}{16}$$

$$\frac{4}{\boxed{}} = \frac{12}{15}$$

$$\frac{2}{3} = \frac{6}{\boxed{}}$$

$$\frac{2}{7} = \frac{\boxed{}}{28}$$

$$\frac{5}{6} = \frac{\boxed{}}{18}$$

$$\frac{7}{8} = \frac{14}{\boxed{}}$$

$$\frac{1}{8} = \frac{\boxed{}}{32}$$

$$\frac{3}{7} = \frac{15}{\boxed{}}$$

$$\frac{5}{6} = \frac{\boxed{}}{24}$$

$$\frac{7}{\boxed{}} = \frac{14}{16}$$

$$\frac{8}{10} = \frac{32}{\boxed{}}$$

Comparing Fractions

$$\frac{6}{7} \boxed{} \frac{4}{5}$$

$$\frac{3}{6} \boxed{} \frac{1}{6}$$

$$\frac{2}{5} \boxed{} \frac{6}{7}$$

$$\frac{4}{9} \boxed{} \frac{3}{6}$$

$$\frac{1}{2} \boxed{} \frac{5}{7}$$

$$\frac{3}{7} \boxed{} \frac{2}{9}$$

$$\frac{3}{4} \boxed{} \frac{4}{5}$$

$$\frac{1}{7} \boxed{} \frac{3}{8}$$

$$\frac{2}{5} \boxed{} \frac{4}{5}$$

$$\frac{7}{9} \boxed{} \frac{1}{2}$$

$$\frac{4}{5} \boxed{} \frac{7}{9}$$

$$\frac{3}{8} \boxed{} \frac{6}{7}$$

Adding Fractions

$$\frac{1}{3} + \frac{5}{18}$$

$$\frac{4}{9} + \frac{1}{3}$$

$$\frac{11}{20} + \frac{2}{5}$$

$$\frac{1}{3} + \frac{1}{9}$$

$$\frac{3}{7} + \frac{5}{14}$$

$$\frac{8}{9} + \frac{1}{18}$$

$$\frac{7}{16} + \frac{1}{2}$$

$$\frac{3}{20} + \frac{3}{4}$$

$$\frac{11}{20} + \frac{3}{10}$$

Subtracting Fractions

$$\frac{3}{4} - \frac{9}{16}$$

$$\frac{2}{3} - \frac{8}{15}$$

$$\frac{17}{20} - \frac{3}{4}$$

$$\frac{11}{18} - \frac{2}{9}$$

$$\frac{5}{8} - \frac{1}{2}$$

$$\frac{1}{2} - \frac{3}{20}$$






$$\frac{5}{8} - \frac{1}{2}$$

$$\frac{4}{7} - \frac{1}{3}$$






Student Opinion Scale

Please think about the math tests you just completed. Circle the answer that best represents how you feel about each of the statements below.






1. Doing well on fraction assignments is important to me.

				
1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. I gave good effort throughout the fraction assignments.

				
1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3. I know how much I understand fractions.






				
1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

4. I know what I can do to improve.






				
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1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree






5. I am curious about how I did on *this* test relative to others.

 1 Strongly Disagree  2 Disagree  3 Neutral  4 Agree  5 Strongly Agree






6. I am concerned about the score I receive on *this* test.

 1 Strongly Disagree  2 Disagree  3 Neutral  4 Agree  5 Strongly Agree

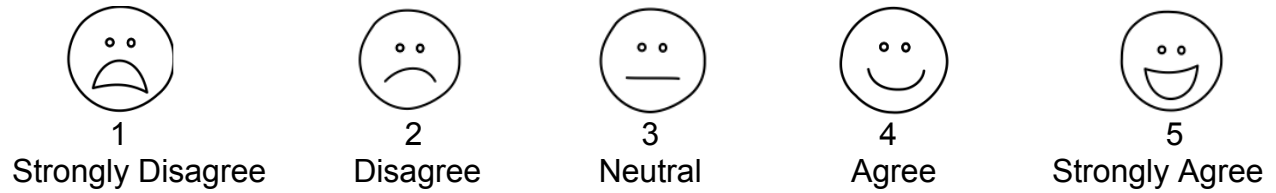
7. *This* was an important test to me.

 1 Strongly Disagree  2 Disagree  3 Neutral  4 Agree  5 Strongly Agree

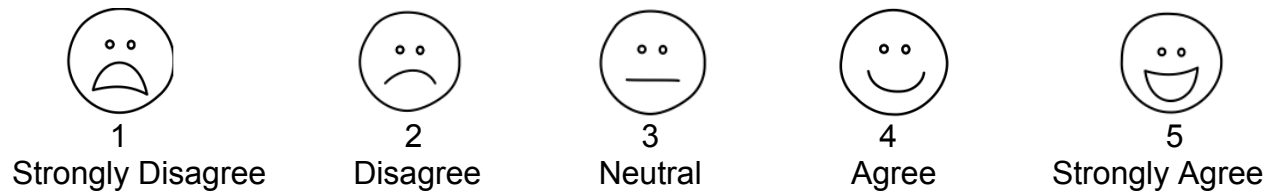
8. I gave my best effort on *this* test.

 1 Strongly Disagree  2 Disagree  3 Neutral  4 Agree  5 Strongly Agree

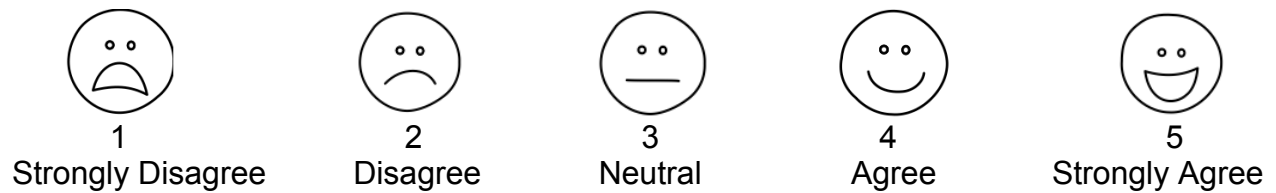
9. While taking *this* test, I could not have worked harder on it.



10. I would like to know how well I did on *this* test.



11. I gave *this* test my full attention while completing it.



12. While taking this test, I was able to persist to completion of the task.

